

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-18 are currently pending. Claims 1-18 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Claims 2, 4, and 6 were rejected under 35 U.S.C. §112, second paragraph, as being “difficult to understand” and “grammatically awkward”; Claims 1 and 7 were rejected under 35 U.S.C. §103(a) as being unpatentable over “the admitted prior art in Figure 10” (hereinafter the ‘Background Art’) in view of U.S. Patent 5,706,313 to Blasiak et al. (hereinafter “the ‘313 patent”) and U.S. Patent 6,574,775 to Chouly (hereinafter “the ‘775 patent”); Claims 3, 5, 9, and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over the “Background Art” in view of the ‘313 and ‘775 patents, further in view of U.S. Patent 6,269,124 to Nagayasu et al. (hereinafter “the ‘124 patent”); Claims 8, 13, and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,574,283 to Skoda et al. (hereinafter “the ‘283 patent”) in view of the “Background Art”, the ‘313 patent, and the ‘775 patent; and Claims 10, 12, and 15-18 were rejected under 35 U.S.C. §103(a) as being unpatentable over the ‘283 patent in view of the “Background Art”, the ‘313 patent, the ‘775 patent, and the ‘124 patent.

Applicants respectfully submit that the rejections of Claims 2, 4, and 6 under 35 U.S.C. §112, second paragraph, are rendered moot to the present amendment to those claims. Claims 2, 4, and 6 have been amended to clarify the functioning of the soft decision demodulated data estimating unit.

Amended Claim 1 is directed to a demodulator, comprising: (1) a multiple differential phase detected signal output unit configured to calculate phase differences between a

received signal and previously received signals of 1, 2, ..., N symbols (where N is an integer greater than 2) so as to output 1, 2, ..., N symbol differential phase detected signals; and (2) a soft decision demodulated data estimating unit configured to estimate a transmitted differential phase sequence according to the 1, 2, ..., N symbol differential phase detected signals using a trellis diagram representing transitions of differential phase states of transmitted signals and a Viterbi algorithm, and to estimate soft decision demodulated data according to the estimated transmitted differential phase sequence and a survival path metric that transits into each state on the trellis diagram. Further, Claim 1 recites that the soft decision demodulated data are estimated as the product of hard decision data and reliability information. Claim 1 has been amended to clarify that the reliability information is defined as a difference between two of the survival path metrics on the trellis diagram. The changes to Claim 1 are supported by the originally specification and do not add new matter.¹

Applicants respectfully submit that the rejection of Claim 1 under 35 U.S.C. §103(a) is rendered moot by the present amendment to Claim 1.

Regarding the rejection of Claim 1, the Office Action asserts that the “Background Art” discloses everything in Claim 1 with the exception of the soft decision demodulated data estimating unit, and relies on the ‘313 and ‘775 patents to remedy that deficiency.

The “Background Art” is directed to a multiple differential phase detector 500, as shown in Figure 10. However, as admitted in the Office Action, the “Background Art” fails to disclose the soft decision to modulated data estimating unit recited in Claim 1.

The ‘313 patent is directed to a soft decision digital communications method and apparatus for decoding a coherent differentially encoded multilevel phase-shift keyed (DEPSK) modulated signal. The ‘313 patent discloses that the metric computer 201

¹ See, e.g., original Claims 2, 4, and 6; and page 34 of the specification.

generates a soft decision matrix corresponding to the coherent DEPSK modulated signal, which is then outputted to a Forward Error Correction (FEC) decoder 107. However, as admitted in the Office Action, the '313 patent fails to disclose that soft decision to modulated data are estimated as a product of hard decision data and reliability information, as recited in amended Claim 1. Further, Applicants respectfully submit that the '313 patent fails to disclose that the reliability information is defined as a difference between two of the survival metrics on the trellis diagram, as recited in amended Claim 1.

The '775 patent is directed to an iterative decoder and decoding method for decoding a binary block code defined by a parity check matrix. The '775 patent discloses that the iterative decoding includes Q iterations of a non-optimal decoding. The Q-1 first iterations consist of generating a soft decision equal to the product of a reliability data about a receive symbol and the decision called hard decision made about this symbol, and inserting the soft decision into the input of the decoding means for the next iteration.² However, Applicants respectfully submit that the '775 patent fails to disclose that the reliability information is defined as a difference between two of the survival path metrics on the trellis diagram, as recited in amended Claim 1.

Accordingly, no matter how the teachings of the "Background Art", the '313 patent, and the '775 patent are combined, the combination does not teach or suggest that the reliability information is defined as the difference between two of the survival path metrics on the trellis diagram, as recited in amended Claim 1. Accordingly, Applicants respectfully submit that amended Claim 1 patentably defines over any proper combination of the "Background Art", the '313 patent, and the '775 patent.

² See '775 patent, column 3, lines 42-54.

Claim 7 recites limitations analogous to the limitations recited in Claim 1. Moreover, Claim 7 has been amended in a manner analogous to the amendment to Claim 1.

Accordingly, for the reasons stated above for the patentability of Claim 1, Applicants respectfully submit that the rejection of Claim 7 is rendered moot by the present amendment to that claim.

Applicants respectfully submit that the rejection of Claims 3, 5, 9, and 11 under 35 U.S.C. § 103(a) are rendered moot by the present amendment to those claims. Claims 3, 5, 9, and 11 have been amended to add the limitation added to Claim 1. However, as discussed above, the Background Art, the '313 patent, and the '775 patent each fail to disclose that the reliability information is defined as the difference between two of the survival path metrics on the trellis diagram, as recited in Claims 3, 5, 9, and 11.

The '124 patent is directed to a data transmission system, receiver, and recording medium in which a soft decision circuit 18 outputs soft decision data so as to decrease the number of different bits between the pseudo transmission signals and the received signals, and the received data are generated based on the soft decision data. However, Applicants respectfully submit that the '124 patent fails to cure the deficiencies of the Background Art, the '313 patent, and the '775 patent, as discussed above. In particular, the '124 patent fails to disclose that the reliability information is defined as the difference between two of the survival path metrics on the trellis diagram, as recited in Claims 3, 5, 9, and 11. Accordingly, Applicants respectfully submit that Claims 3, 5, 9, and 11 patentably define over any proper combination of the Background Art, the '313 patent, the '775 patent, and the '124 patent.

Applicants respectfully submit that the rejections of Claims 8, 10, and 12-18 under 35 U.S.C. §103(a) are rendered moot by the present amendment to those claims. Claims 8, 10, and 12-18 have been amended to add the limitation added to amended Claim 1. However, as discussed above, the "Background Art", the '313 patent, the '124 patent, and the '775 patent

each fail to disclose that the reliability information is defined as the difference between two of the survival path metrics on the trellis diagram. Further, Applicants respectfully submit that the '283 patent also fails to disclose that the reliability information is defined as the difference between two of the survival path metrics on the trellis diagram, as recited in amended Claims 8, 10, and 12-18. Accordingly, Applicants respectfully submit that amended Claims 8, 10, and 12-18 patentably define over any proper combination of the '283 patent, the '313 patent, the '775 patent, the '124 patent, and the "Background Art".

Thus, it is respectfully submitted that independent Claims 1, 3, 5, and 7-18 (and all associated dependent claims) patentably define over any proper combination of the "Background Art" and the '313, '775, '124, and '283 patents.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

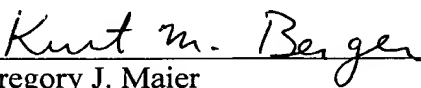
Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)
KMB/rac



Gregory J. Maier
Attorney of Record
Registration No. 25,599
Kurt M. Berger, Ph.D.
Registration No. 51,461